eBox-2300

Windows Embedded CE 6.0

Jump Start Guide

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This is a step-by-step guide showing the process to build Windows Embedded CE 6.0 image for the eBox-2300 using Platform-Builder and the ICOP_Vortex86_60CS BSP.

Introduction

Learning by example and learn by doing are effective methods to learn new technology. This step-by-step guide, using hands-on-lab approach, is created to show the process of creating, customizing, building and downloading a Windows Embedded CE 6.0 image on to eBox-2300 using the ICOP_Vortex86_60CS Board-Support-Package for CE 6.0. This guide also shows how to create a Hello-world Visual Studio 2005 C# managed code application, establish a connection between eBox-2300 and Visual Studio 2005 workstation using Corecon and download the application to eBox-2300 for testing.

The samples in this guide have been tested on Windows XP Professional and Windows Vista development stations.

- On the Windows XP Professional SP2 development station, Visual Studio 2005, Visual Studio 2005 SP1, Windows Embedded CE 6.0 and ICOP_Vortex86_60CS BSP for CE 6.0 are installed.
- On the Windows Vista development station, Visual Studio 2005, Visual Studio 2005 SP1, Visual Studio 2005 SP1 Update for Vista, Windows Embedded CE 6.0 and ICOP_Vortex86_60CS BSP for CE 6.0 are installed.

An eBox-2300 is used as the target-hardware device. Detailed information about eBox-2300 is available in appendix D. Both the development station and eBox-2300 are connected to the same local LAN segment with DHCP service.

This guide provides a quick and easy overview showing how to create, configure and build Windows Embedded CE 6.0 OS image for eBox-2300 and develop managed code application that runs on CE 6.0. Additional subjects relevant to Vortex86 hardware and application development using Visual Studio 2005 are provided.

Additional references and other technical information for Windows Embedded CE are listed in Appendix C.

> **Note**: *To go through all of the exercises in this guide, you need to have Visual Studio 2005, Windows Embedded CE 6.0 Platform Builder and ICOP_Vortex86_60CS Board-Support-Package installed on your development station. Refer to appendix A & B for device preparation and setup information.*

eBox-2300 JumpStart Kit

eBox-2300 JumpStart kit includes the following

- An eBox-2300 embedded system with 128MB RAM and a 256MB EmbedDisk (IDE bootable flash storage) & power supply.

  The eBox-2300 is pre-configured to boot to DOS and provide various options to load the Windows CE image. A pre-built Windows Embedded CE 6.0 image is included.

- Windows Embedded CE 6.0 Platform Builder evaluation version CD/DVD

  This is a fully functional 180-day evaluation version of Windows Embedded CE 6.0 Platform Builder. A 180-day evaluation version of Visual Studio 2005 Professional is also included.

- An eBox-2300 Windows Embedded CE 6.0 JumpStart CD

  ICOP_Vortex86_60CS Board-Support-Package, SDK and a pre-built Windows Embedded CE 6.0 image are on this CD along with other resources.

- One RJ-45 Ethernet Crossover cable

  With a crossover Ethernet cable and proper static IP address settings, Windows CE device can be connected directly to the development workstation to create a stand alone development environment.

- One DB-9 female to DB-9 female null modem serial cable
  The null modem serial cable is used to connect between COM1 of the Windows CE device to an available serial port on the development workstation. Debug messages from the Windows CE device can be captured by using Hyper Terminal, with serial port setting setup for 38400 Baud and 8 data bits-No parity-1 stop bit.

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Part 1 – What's New

Windows Embedded CE 6.0

The Windows Embedded CE 6.0 operating system combines the richest real-time embedded operating system with the most powerful tools for rapidly creating the next generation of smart, connected, and small-footprint devices. The latest version, Windows Embedded CE 6.0, expands upon the solid foundation developed in previous Windows CE versions by providing:

- Increase the ability to handle 32,000+ processes
- Increase the memory footprint for each process to 2GB
- Production Quality device drivers
- More secure and scalable networking
- Greater real-time processing
- Faster performance
- Richer multimedia and Web browsing capabilities
- Greater interoperability with PCs, servers, Web services, and devices

Windows Embedded CE 6.0 delivers reliable, secure performance in a small footprint along with the latest networking and communications technologies. Windows Embedded CE 6.0 provides developers with broad device support and enhanced features, including voice over IP (VoIP) phone and gateway configurations, platform development tool enhancements, greater application compatibility with other Windows CE-based devices, Internet Explorer 6.0, Windows Media Codecs, Microsoft .NET Compact Framework, and a number of other newly supported protocols and services.

Visit http://msdn.microsoft.com/embedded/windowsce/default.aspx for more information about Windows CE.

Windows Embedded CE 6.0 Development Tools

Platform Builder is the development tool used to configure an OS Design and build a Windows CE image from the OS Design. The previous versions of Windows CE Platform Builder were stand alone development tools. This latest version, Windows Embedded CE 6.0 Platform Builder, is a Plug-in for Visual Studio 2005.

Note: *Visual Studio 2005 SP1 is needed to develop application for Windows Embedded CE 6.0. When evaluating or using new technology and development tool, it's good practice to install all update, QFE and patches.*

For Windows Vista, in addition to Visual Studio 2005 SP1, Visual Studio 2005 SP1 Update for Vista is also needed.

Part 2 – Windows Embedded CE 6.0 Installation

This latest version Windows Embedded CE 6.0 ("CE 6.0") Platform Builder is a plug-in to Visual Studio 2005 ("VS2005"), take advantage of VS2005 IDE & tools.

Board-Support-Package ("BSP") consists of all necessary CE 6.0 device drivers and hardware abstraction library for the hardware is needed by PB to create OS Design and build CE 6.0 image for the hardware. **ICOP_Vortex86_60CS** BSP is provided as part of this jumpstart kit to create OS Design and build CE 6.0 image for eBox-2300.

Corecon is the component needed to establish link between eBox-2300 and VS2005 development station for the purpose of developing CE 6.0 application and download the application onto eBox-2300 for testing and debug.

For Windows XP development station, it's recommended to install VS2005, CE 6.0 and BSP in the following sequences.

1. Visual Studio 2005
2. Visual Studio 2005 SP1
3. Windows Embedded CE 6.0
4. BSPs

For Windows Vista development station, it's recommended to install VS2005, CE 6.0 and BSP in the following sequences.

1. Visual Studio 2005
2. Visual Studio 2005 SP1
3. Visual Studio 2005 SP1 Update for Vista
4. Windows Embedded CE 6.0
5. BSPs

Platform Builder Installation

Platform Builder ("PB") is the tool used to configure and build CE 6.0 OS images. To install PB, Visual Studio 2005 ("VS2005") must already be installed onto the develop station. While PB installation does not require VS2005 SP1 to installed, it's required to install SDK generated by PB for the OS Design to support CE 6.0 application development using VS2005.

By default, PB installation program only selects and includes **ARMV4I** CPU support with the installation. eBox-2300 is an x86 device. **X86** CPU support must be installed with PB to use the ICOP_Vortex86_6CS BSP and build CE 6.0 image for eBox-2300.

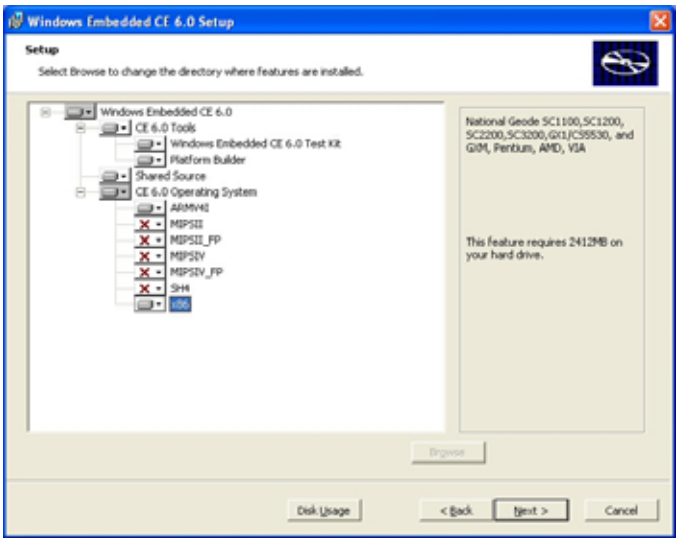


Fig. 1 - CE 6.0 installation, supported CPU selection

Board-Support-Package Installation

To install and use ICOP_Vortex86_60CS BSP with CE 6.0, after CE 6.0 is installed (with x86 CPU support), run the **ICOP_Vortex86_60CS_BSP.msi** from the JumpStart CD. It's located in the CD's BSP folder.

Note: x86 CPU support for CE 6.0 PB is needed in order to use ICOP_Vortex86_60CS BSP to create OS Design and build CE 6.0 image for eBox-2300.

VS2005 CoreCon Component Installation

Corecon component files for x86 devices are included as part of VS2005 installation and located in the following default installation folder.

..\Program Files\Common Files\Microsoft Shared\CoreCon\1.0\Target\WCE400\x86

There are different sets of Corecon component files to support different type of CPU, and located in the relative folder with name of the CPU.

..\Program Files\Common Files\Microsoft Shared\CoreCon\1.0\Target\WCE400\<CPU>

CoreCon files can be copied to a CE 6.0 image after the image is built, and use them to establish link between the CE 6.0 device and VS2005 development station. The need to copy CoreCon files to a CE 6.0 device every time after reset to establish link with VS2005 development station is inefficient and waste of precious development time.

A CoreCon catalog component for CE 6.0, in MSI self installable file format, is provided with the JumpStart kit CD. To install, locate and execute **VS2005_CoreCon_x86_WINCE600.msi** on the CD. It's located in the CD's CoreCon folder. After installation, The CoreCon component shows up on CE 6.0 Platform Builder Component catalog as "**ConMan_x86 Files Component**". By including this component as part of an OS Design, CoreCon files will be compiled into the resulting CE 6.0 image.

Part 3 – Configure an OS Design

This section will guide you thru the process of creating and configuring an OS design using the New Platform Wizard within Platform Builder, to create an initial OS design workspace which you will then modify by adding Windows CE components, applications and making changes to the registry.

Visual Studio 2005 IDE

Windows Embedded CE 6.0 ("CE 6.0") Platform Builder is a Visual Studio 2005 ("VS2005") plug-in. To use Platform Builder ("PB"), you need to start VS2005 and access PB from VS2005 Integrated Development Environment ("IDE").

When starting VS2005, you should see a VS2005 screen similar to the following:

Fig. 2 - Visual Studio 2005 IDE

Visual Studio 2005 provides a common Integrated Development Environment (IDE) for Visual Basic, Visual C++, Visual C#, Visual J# and Platform Builder. Depending on the development preference selected during the installation of VS2005, your VS2005 screen may look different from the above.

VS2005 IDE provides support to create different type of projects, such as Windows Application, Console Application, Class Library, smart device application, Windows Services, Web Control, etc…

When starting a new project with VS2005, there are options for different type of projects. PB for CE 6.0 is one of the available project types. From VS2005 IDE, select "**File | New | Project …**" the following project screen will appear.

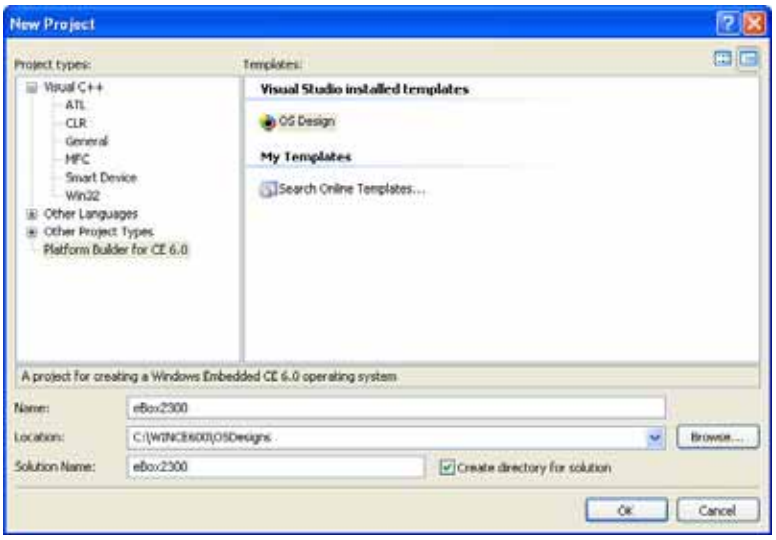


Fig. 3 - VS2005 New Project

- On the left side of the New Project screen, click to high-light **Platform Builder for CE 6.0**.
- On the right side of the New Project screen, click to high-light **OS Design**.
- Enter **eBox2300** as the name of the project.
- Make sure the **Create directory for solution** check box is checked.
- Click on the **OK** button to continue.

Windows Embedded CE 6.0 OS Design Wizard

When a new CE 6.0 OS Design project is selected, the **Windows Embedded CE 6.0 OS Design Wizard** starts automatically to guide you thru the process and help configure an OS Design.

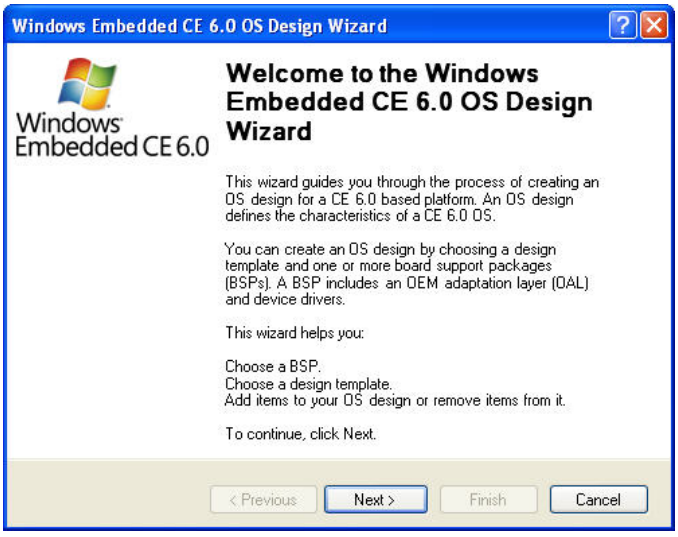

Windows Embedded CE 6.0 OS Design Wizard
Windows Embedded CE 6.0
Welcome to the Windows Embedded CE 6.0 OS Design Wizard
This wizard guides you through the process of creating an OS design for a CE 6.0 based platform. An OS design defines the characteristics of a CE 6.0 OS.
You can create an OS design by choosing a design template and one or more board support packages (BSPs). A BSP includes an OEM adaptation layer (OAL) and device drivers.
This wizard helps you:
Choose a BSP.
Choose a design template.
Add items to your OS design or remove items from it.
To continue, click Next.
< Previous
Next >
Finish
Cancel

Fig. 4 - Windows Embedded CE 6.0 OS Design Wizard

- Click on the **Next** button to continue

OS Design Wizard – Board Support Packages (BSPs)

In the BSP selection step, the OS Design Wizard provides the option to select one or more BSP for the new project, from a list of available BSP. All of the installed BSPs, including BSPs from third party companies are listed.

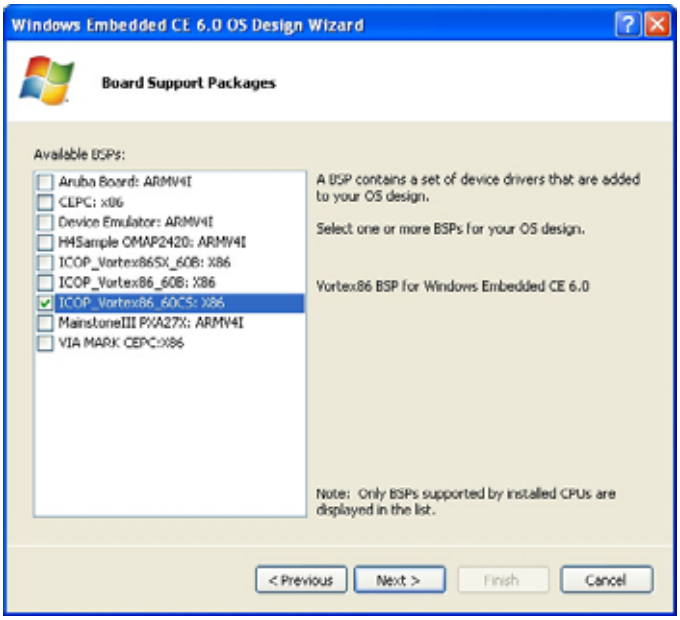

Windows Embedded CE 6.0 OS Design Wizard
Board Support Packages
Available BSPs:
Aruba Board: ARMV4I
CEPC: x86
Device Emulator: ARMV4I
HMSample OMAP2420: ARMV4I
ICOP_Vortex86SX_60B: X86
ICOP_Vortex86_60B: X86
ICOP_Vortex86_60CS: X86
MainstoneIII PXA27X: ARMV4I
VIA MARK CEPC:X86
A BSP contains a set of device drivers that are added to your OS design.
Select one or more BSPs for your OS design.
Vortex86 BSP for Windows Embedded CE 6.0
Note: Only BSPs supported by installed CPUs are displayed in the list.
< Previous
Next >
Finish
Cancel

Fig. 5 - OS Design Wizard – Select BSP

- Select **ICOP_Vortex86_60CS: x86** BSP
- Click on the **Next** button to continue

OS Design Wizard – Design Templates

In the design templates selection step, the OS Design Wizard provides the options to select an OS Design Template.

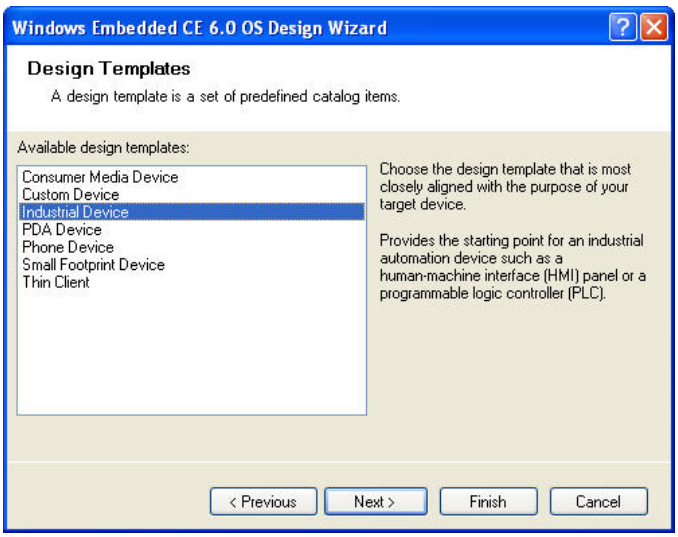

Windows Embedded CE 6.0 OS Design Wizard
Design Templates
A design template is a set of predefined catalog items.
Available design templates:
Consumer Media Device
Custom Device
Industrial Device
PDA Device
Phone Device
Small Footprint Device
Thin Client
Choose the design template that is most closely aligned with the purpose of your target device.
Provides the starting point for an industrial automation device such as a human-machine interface (HMI) panel or a programmable logic controller (PLC).
< Previous
Next >
Finish
Cancel

Fig. 6 - OS Design Wizard – Design Templates

- Click to high-light and select **Industrial Device**
- Click on the **Next** button to continue

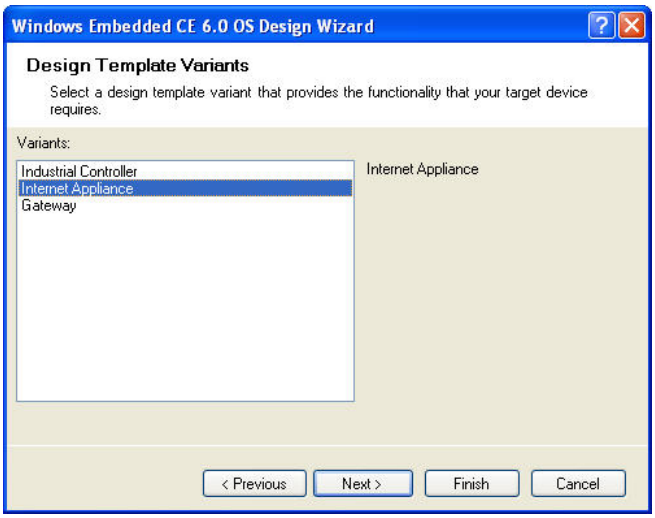


Fig. 7 - OS Design Wizard – Design Template Variants

- Click to high-light and select **Internet Appliance**
- Click on the **Next** button to continue

OS Design Wizard – Applications & Media

In the applications & media selection step, the OS Design Wizard provides the options to select .NET Compact Framework to support managed code applications, Internet Explorer, Windows Media components, etc...

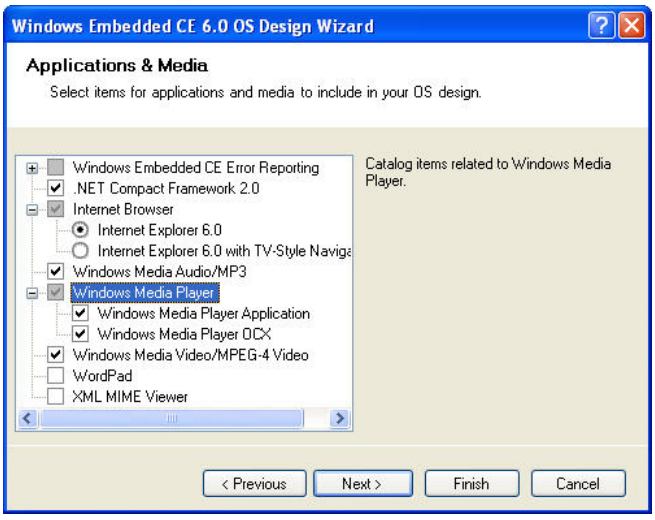

Windows Embedded CE 6.0 OS Design Wizard
Applications & Media
Select items for applications and media to include in your OS design.
Windows Embedded CE Error Reporting
.NET Compact Framework 2.0
Internet Browser
Internet Explorer 6.0
Internet Explorer 6.0 with TV-Style Naviga
Windows Media Audio/MP3
Windows Media Player
Windows Media Player Application
Windows Media Player OCX
Windows Media Video/MPEG-4 Video
WordPad
XML MIME Viewer
Catalog items related to Windows Media Player.
< Previous
Next >
Finish
Cancel

Fig. 8 - OS Design Wizard – Applications & Media

The following components are selected for this exercise.

- .NET Compact Framework 2.0
- Internet Explorer 6.0

- Windows Media Audio/MP3
- Windows Media Player Application
- Windows Media Player OCX
- Windows Media Video/MPEG-4 Video
- Click on the **Next** button to continue

OS Design Wizard – Networking & Communications

In the networking & communications step, the OS Design Wizard provides the options to select communication, networking and security components.

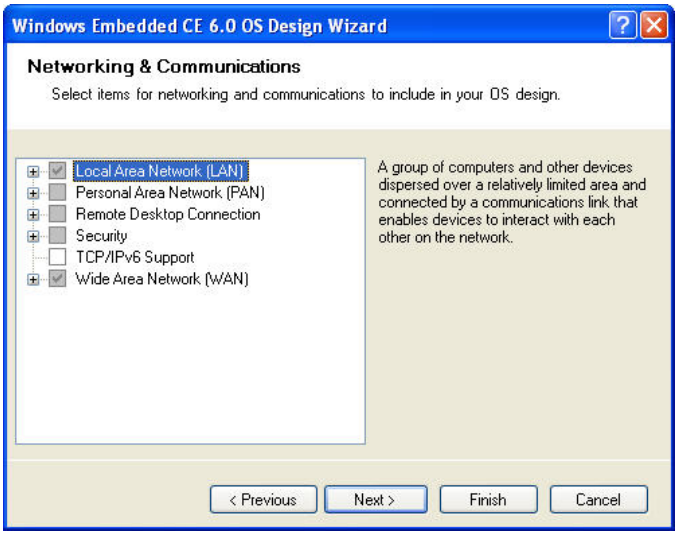

Windows Embedded CE 6.0 OS Design Wizard
Networking & Communications
Select items for networking and communications to include in your OS design.
Local Area Network (LAN)
Personal Area Network (PAN)
Remote Desktop Connection
Security
TCP/IPv6 Support
Wide Area Network (WAN)
A group of computers and other devices dispersed over a relatively limited area and connected by a communications link that enables devices to interact with each other on the network.
< Previous
Next >
Finish
Cancel

Fig. 9 - OS Design Wizard – Networking & Communications

We will use the default settings for networking and communications. Click on the **Next** button to continue.

OS Design Wizard – Complete

At this point, the OS Design Wizard completed its task and collected the necessary OS Design parameters to configure an OS Design based on the selected template and support components.

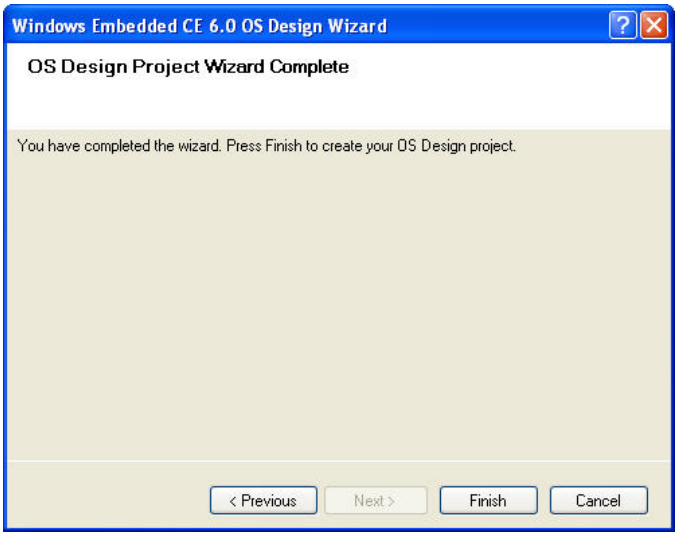

Windows Embedded CE 6.0 OS Design Wizard
OS Design Project Wizard Complete
You have completed the wizard. Press Finish to create your OS Design project.
< Previous
Next >
Finish
Cancel

Fig. 9 - OS Design Wizard – Completed

- Click on the **Finish** button to continue.

Catalog Item Notification

At the completion of OS Design Wizard, a security warning is raised to provide a warning for any components included in the OS Design that can pose a security risk.

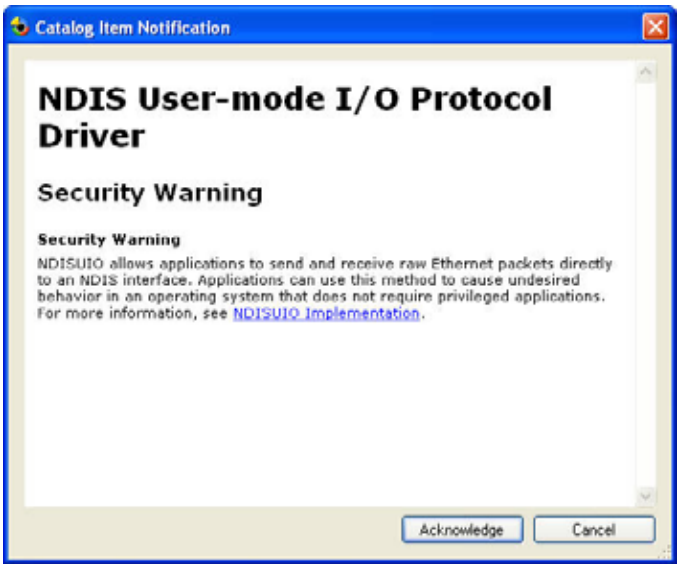

Catalog Item Notification
NDIS User-mode I/O Protocol Driver
Security Warning
Security Warning
NDISUIO allows applications to send and receive raw Ethernet packets directly to an NDIS interface. Applications can use this method to cause undesired behavior in an operating system that does not require privileged applications. For more information, see NDISUIO Implementation.
Acknowledge
Cancel

Fig. 10 - Catalog Item Notification – Security Warning

Click on the **Acknowledge** button to complete the OS Design Wizard steps.

Platform Builder will generate the necessary OS Design project folders and pull in all the components required by the Internet Appliance OS Design template along with the components selected during the OS Design Wizard steps.

Part 4 – Customize and build the OS Design

At this point, with the help of the OS Design Wizard, the **eBox2300** project is created using the **Internet Appliance** design template along with **ICOP_Vortex86_60CS** BSP. The following project folders have been created for the **eBox2300** project, under the main CE 6.0 Platform Builder's OS Designs directory (..**WINCE600\OSDesigns**).

- C:\WINCE600\OSDesigns\eBox2300\

  Folder for the eBox2300 Solution

  VS2005 supports different project types. A solution provides a centralized work environment to keep different project types supporting the same solution in one location.

  For example, the eBox2300 solution may include an "eBox2300 OS Design", "Visual Basic managed code application", "Visual C# managed code application" and "Visual C++ native code application".

- C:\WINCE600\OSDesigns\eBox2300\eBox2300\

  This is the folder for the eBox2300 CE 6.0 Platform Builder project, an OS Design.

Your VS2005 IDE should look similar to the following screen:

Fig. 11 - VS2005 IDE after OS Design Wizard

Add Components to the OS Design

The Catalog Item View window lists all of the available Windows CE components, including applications, library, drivers, utilities & 3rd party components that can be added to the OS Design. An existing set of components are included in the OS Design by the Wizard based on the BSP and design template selected during the OS Design Wizard phase.

To enhance the function and features of the OS image, additional components (drivers, utilities, applications, etc.) selected from the component catalog can be added to the OS Design.

- On the Catalog Items tab, expand the **Third Party**, **BSP**, **ICOP_Vortex86_60CS: x86** and all sub folder under **Device Drivers**, check to make sure the following drivers are selected as part of the OS Design.
    - **Device Drivers | Vortex86_Audio**
    - **Device Drivers | Vortex86_Display**

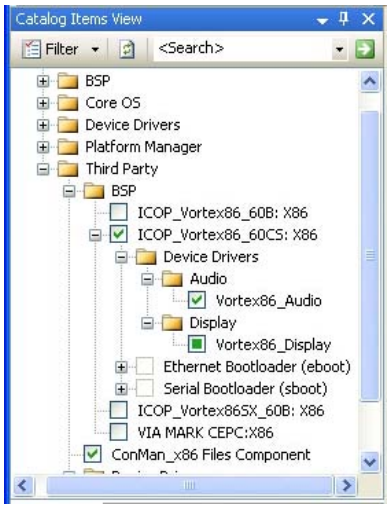


Fig. 12 - Component Catalog

- Expand **Third Party** catalog items and select **ConMan_x86 Files Component**. This component adds the CoreCon files to the final image, needed to establish connection between the CE 6.0 device and VS2005 development station.

- Expand **Core OS | CEBASE** catalog items, find and include the following components to the OS Design.
    - **Applications-End User | CAB File Installer/Uninstaller**

      This component provides application installation & removal. It's needed for application development using Visual Studio .NET 2003 and Visual Studio 2005.
    - **Core OS Services | USB Host Support | USB Storage Class Driver**

      This component provides support for hot pluggable USB storage device supporting most USB flash drive and external USB mass storage device.

- .NET Compact Framework 2.0 components are needed to support managed code application. During the OS Design wizard steps, .NET Compact Framework 2.0 components were selected to include in the OS Design. If not selected during the OS Design wizard phase, make sure the following two components are included.
    - **.NET Compact Framework 2.0**
    - **OS Dependencies for .NET Compact Framework 2.0**

- Expand **Core OS | CEBASE | File Systems and Data Store** catalog items, find and include the following file system components to the OS Design.
    - **RAM and ROM File System**

      The RAM and ROM file system driver capable of reading data from the ROM and RAM file system in the object store.
    - **Hive-based Registry**

      This component provides the function for the system to persist registry setting changes when the device is powered off

      Note: The following environment variables need to be set for this component to function.
        - PRJ_ENABLE_FSREGHIVE
        - PRJ_BOOTDEVICE_ATAPI
        - PRJ_ENABLE_FSMOUNTASROOT

Other Windows Embedded CE 6.0 Components

In addition to the components selected during the OS Design wizard and the components automatically included in the OS Design by the template, additional components from the catalog can be included into the OS Design to provide the associated function.

For example, the **File Server** component can be added to provide files and folders sharing over a network connection. The **FTP Server** component can be added to provide remote file upload and download services. The **RAS Server/PPTP Server (Incoming)** component can be added to provide inbound dialup network connection via the serial port.

Following is a list of eBox-2300 I/O peripherals and the associated CE 6.0 device drivers and support components.

eBeBox-2300 Peripherals	**Windows Embedded CE 6.0 Drivers & Support Components**
Video (SiS-550)	Vortex86_Display (Driver included with BSP)
Audio (SiS-7019)	Vortex86_Audio (Driver included with BSP)
Ethernet (RealTek-8100)	RTL8139 (Driver available from PB's component catalog)

Serial Ports	Com16550 (Driver available from PB's component catalog)
Serial Ports	Serial Port Support (Support components from PB's component catalog)
USB Ports (USB 1.1 Host)	OHCI (Driver available from PB's component catalog)
CompactFlash*[1]	ATAPI (Driver available from PB's component catalog)
IDE	ATAPI (Driver available from PB's component catalog)

*[1] The CompactFlash ("CF") slot on eBox-2300 is link to the IDE interface, and does NOT support hot-swap. When a CF card is plugged into the slot prior to power on, the system will detect and recognize the CF card as slave IDE storage. When booting to CE 6.0, the CF card will shows up as "Hard Disk 2"

To learn more about each of the components on the catalog, refer to the help document.

Configuration Manager – Debug & Release Build

Using the configuration manager, the OS Design can be configured to generate a debug or release image. A debug image will provide debug messages when the compiled OS image loads and executes applications and modules. The size of the debug image is generally about 50% larger in size comparing to the release image built from the same OS design. For the purpose of this guide, let's select the release build.

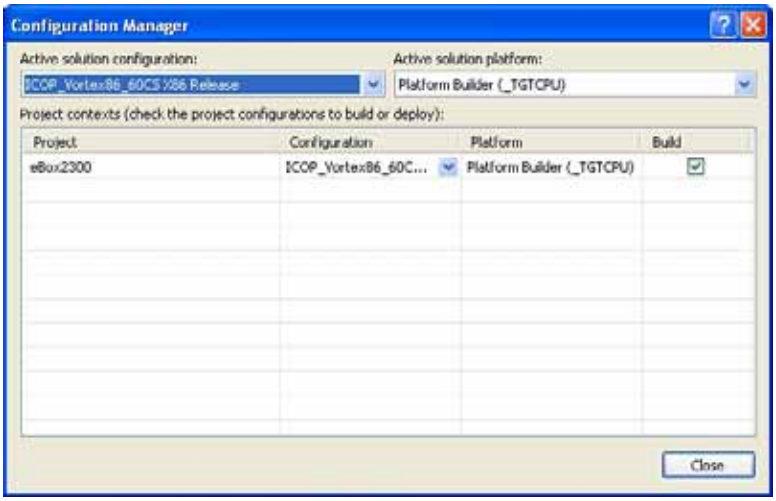


Fig. 13 - Configuration Manager

- From VS2005 IDE, select **Build | Configuration Manager…** to bring up the **Configuration Manager** screen. From the Active solution configuration selection options, select **ICOP_Vortex86_60CS x86 Release** and click the Close button to set the OS Design to generate a Release image.

Note: A Debug image provides more detailed system status and activities information during startup of the OS and when application modules are executing. To generate a debug image, repeat this step and select **ICOP_Vortex86_60CS x86 Debug** option instead, and continue to finish building a debug image.

Configure OS Design Project Properties – Build Options

With different Build Options, the OS Design can be further customized to include additional functions to the final image, provide additional debug resources, etc…

From VS2005 IDE, select **Project | eBox2300 Properties…** to bring up the OS Design Property screen.

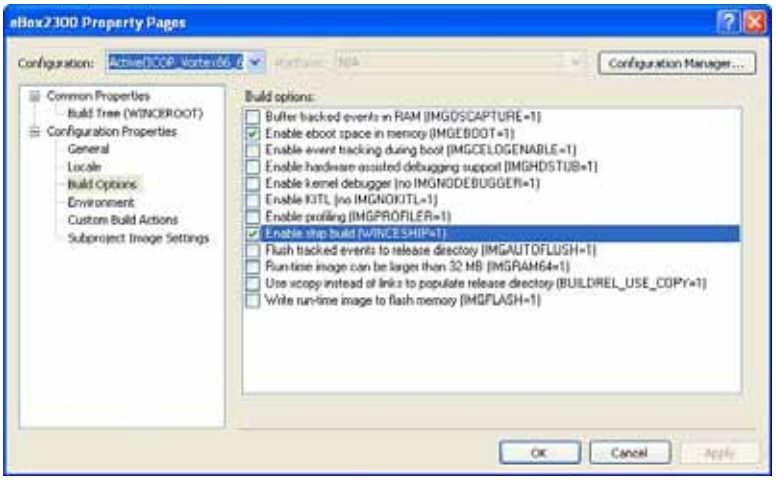


Fig. 14 - OS Design Property – Build Options

- Click to expand **Configuration Properties** tree on the left side of the screen.
- Click to high-light **Build Options**, a list of Build Options with check boxes will be shown on the right side of the screen.
- Select Enable eboot space in memory (IMGEBOOT=1)

  This option adds support for Ethernet debugging by bundling the Ethernet boot loader in the image.
- Select Enable ship build (WINCESHIP=1)

  This option will enable a retail build and suppress debug messages.
- Disable KITL – Make sure the Enable KITL (no IMGNOKITL=1) check box is **NOT** selected.

  Note: When deploying a release image onto eBox-2300's local storage with KITL enabled, the system may not boot or takes a long time to complete the boot process. This is caused by the system looking for an unavailable KITL connection, and it eventually times out and completes the boot.

Configure OS Design Project Property – Environment Variables

Environment variables are used to further customize the OS Design by include/exclude certain components from the image, set device memory range & etc….

Continuing with the OS Design Property screen from the previous step…

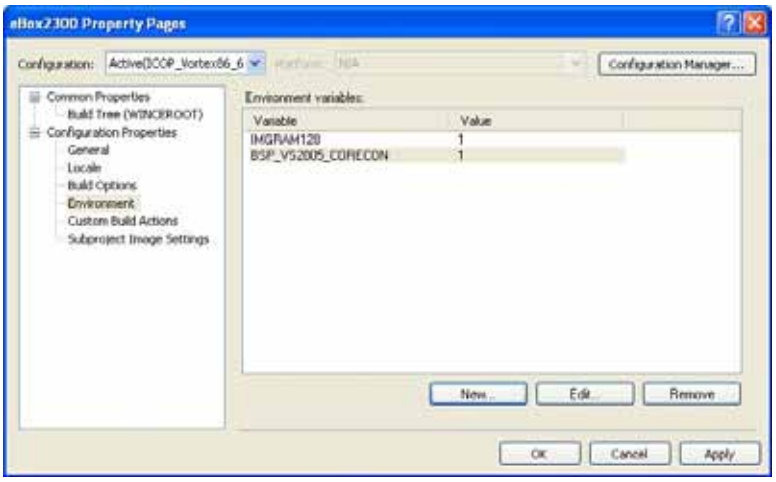


Fig. 15 - eBox2300 Property Pages – Environment variables

- Click to high-light **Environment** on the left side of screen.
- Click on the **New…** button, enter **IMGRAM128** for Variable name, and enter **1** for Variable value and click on the **Ok** button.

  By setting the IMGRAM128 variable, the resulting image is generated for a system with 128MB RAM.

- Click on the **New…** button, enter **PRJ_ENABLE_FSREGHIVE** for Variable name, and enter **1** for Variable value and click on the **Ok** button.

  This is one of the needed variables to enable Hive-based registry to persist registry changes when the device is powered off.

- Follow the previous steps to create **PRJ_BOOTDEVICE_ATAPI** and **PRJ_ENABLE_FSMOUNTASROOT** environment variables and set the values to **1**.

- Click the **Apply** button followed by the **OK** button to complete the configuration

Building Windows Embedded CE 6.0 OS Image

From the VS2005 IDE, select **Build | Build Solution** to build OS image from the OS Design project.

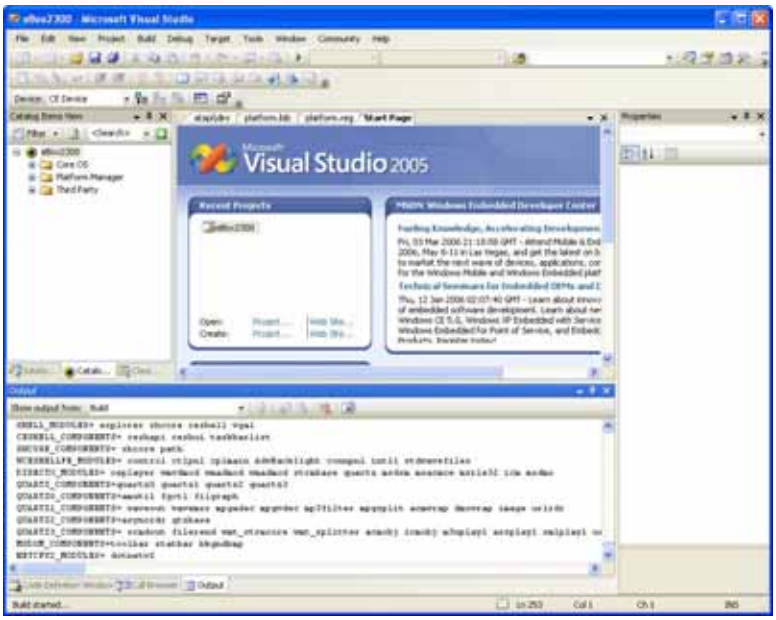


Fig. 16 - VS2005 IDE – OS Design being compile and build

Depending on the speed of the development system, the build process may take approximately 15~20 minutes.

During the build process, the output tab on VS2005 IDE displays compilation activities.

Build Complete - Windows Embedded CE 6.0 OS Image Generated

When the build process is completed, the VS2005 IDE should look like the following:

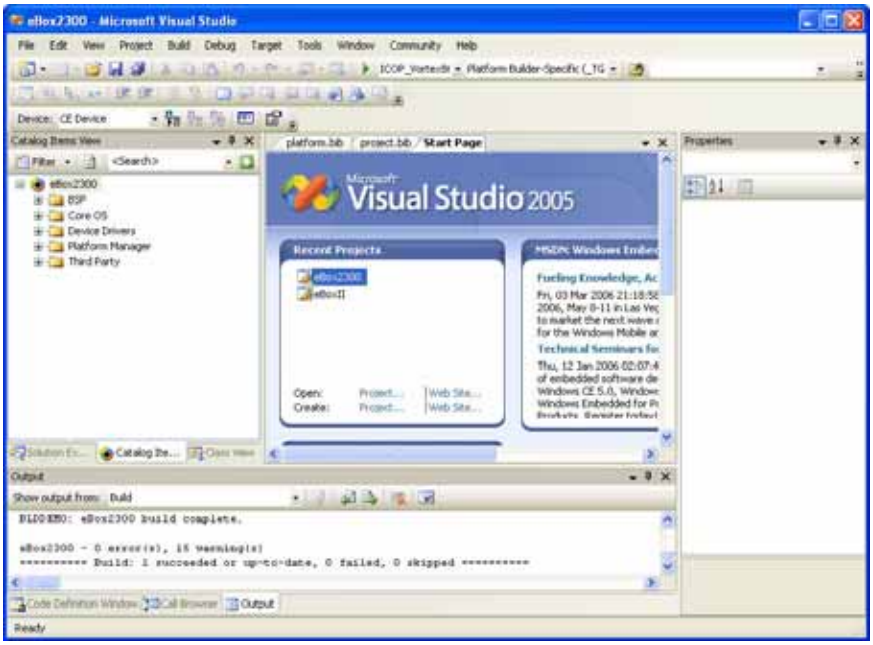


Fig. 17 - VS2005 IDE – Build completed

When the build process is completed, the resulting files are generated in the following build release directories.

For the Debug image:

C:\WINCE600\OSDesigns\eBox2300\eBox2300\RelDir\ICOP_Vortex86_60CS_x86_Debug

For the Release image:

C:\WINCE600\OSDesigns\eBox2300\eBox2300\RelDir\ICOP_Vortex86_60CS_x86_Release

Searching the above directories, with a successful build, there should be a **NK.BIN** file. This is the Windows Embedded CE 6.0 OS image.

The next section will cover connecting the eBox-2300 to the development station to download and execute the image built in this section for the eBox-2300.

Part 5 – Download OS Image to eBox-2300

Configure Target Device Connectivity Options

The image generated from the previous session is ready to be downloaded to the device. A connection between the eBox-2300 and the development station needs to be established to accomplish this task.

Note: Please refer to Appendix A and B for eBox-2300 and development station connectivity information. If there are problem establish connection, disable firewall utility. The firewall utility may be blocking the connection.

From VS2005 IDE, select **Target | Connectivity Options…** to bring up the **Target Device Connectivity Options** screen

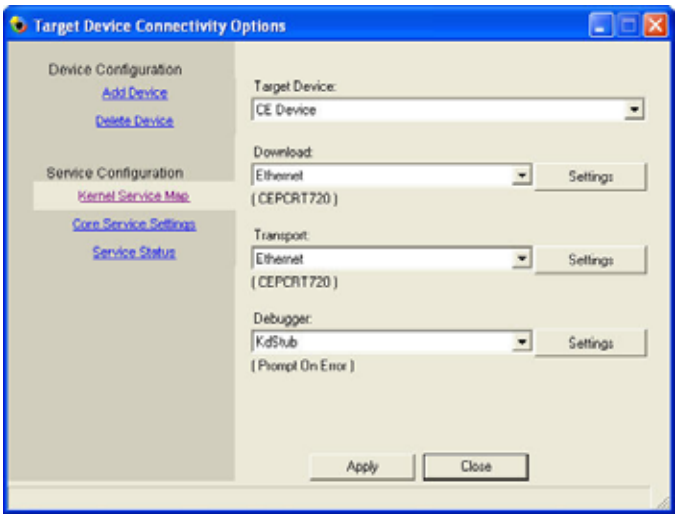


Fig. 18 - Target Device Connectivity Options

A connection can be establish by modifying the default **CE Device** settings. To provide more information about the connectivity option, let's create a device connectivity profile for this project.

Note: Multiple device connectivity profiles can be created to help developer working on multiple projects, or project involving multiple target hardware to be more efficient.

Add New Target Device

From the **Target Device Connectivity Options** screen, clicks on **Add Device** to bring up the new target device screen. Enter **eBox2300** as the new target device name and click on the **Add** button to continue.

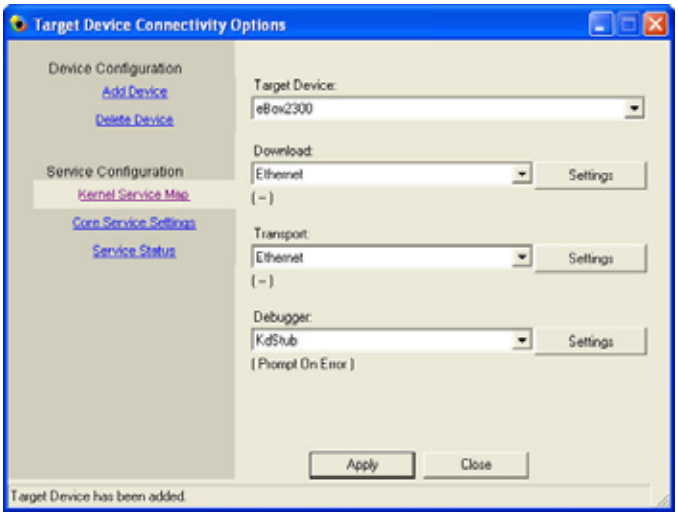


Fig. 19 - Target Device Connectivity Options

Establish Connection with eBox-2300

From the **Target Device Connectivity Options** screen, clicks on one of the **Settings** buttons to bring up the **Ethernet Download Settings** screen.

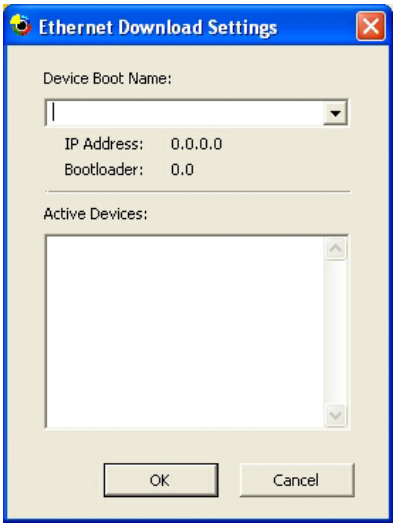


Fig. 20 - Ethernet Download Settings

Turn on power and boot up eBox-2300 with the provided Windows CE SDK boot image. It will boot to DOS and provide the following menu selections.

1. Boot CE/PC (local nk.bin with /L:1024x768x32)
2. Boot CE/PC (ether via eboot.bin with /L:1024x768x32)
3. Boot CE/PC (ether via eboot.bin with /L:800x600x32)
4. Boot CE/PC (ether via eboot.bin with /L:640x480x32)
5. Boot CE/PC (ether via eboot.bin without display settings)
6. Boot CE/PC (Static IP: 192.168.2.232, with /L:1024x768x32)
7. Boot CE/PC (Static IP: 192.168.2.232, with /L:640x480x32)
8. Boot CE/PC (Static IP: 192.168.2.232, without display settings)
9. Clean Boot (no commands)

Option 1: The eBox-2300 will load NK.bin (Windows CE image) from local storage with 1024x768 display resolution.

Option 2 ~ 5: The eBox-2300 will load eboot.bin which in turn will send request to an available DHCP server to assign an IP address. Then, it sends bootme request to the Platform-Builder development station.

Option 6 ~ 8: The eBox-2300 will load eboot.bin with a static IP address (192.168.2.232), and sends a bootme request to the Platform-Builder development station.

Option 9: Boots up to a clean DOS environment.

If the development station and eBox-2300 are connected to a LAN with DHCP service, select option 2, 3, 4 or 5. If eBox-2300 is connected directly to the development station using a cross-over Ethernet cable, select option 6, 7 or 8.

After eBox-2300 boots-up and sends a boot-me request, the **Ethernet Download Settings** dialog screen should look similar to the following, with a device ID listed in the **Active target devices** list box.

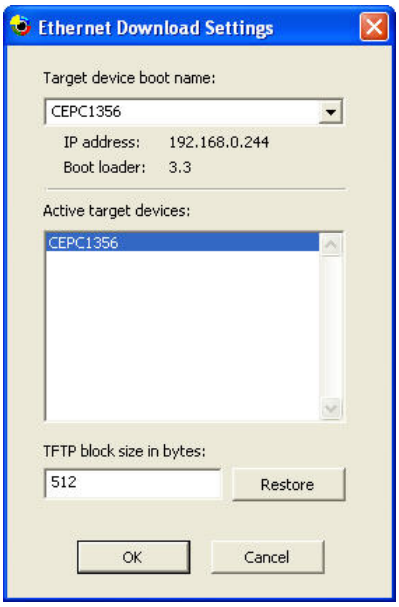


Fig. 21 - Ethernet Download Settings

- Click and highlight the device ID listed in the **Active Devices** window
- Click **Ok** to continue

Note: In the environment where there are multiple eBox-2300s connected to the same network segment, with multiple eBox-2300 sending bootme request, there may be multiple **device IDs** listed in the **Active Devices** windows. To identify the eBox-2300 you are working with, make sure it's the only one booting and sending a bootme request.

On the Target Device Connectivity Options screen, click on **Apply** and then **Close**.

Downloading Image to eBox-2300

You are now ready to download the Windows CE image built during the earlier steps to the eBox-2300. From VS2005 IDE select **Target | Attach Device**. The following "**Download Runtime Image to** …" screen will come up.

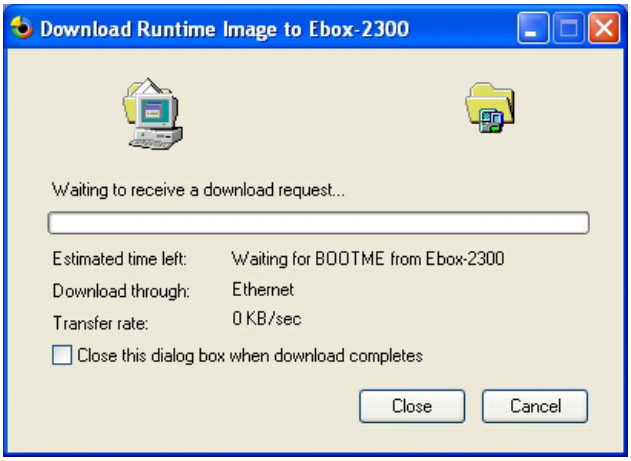


Fig. 22 - Download Runtime Image / waiting for bootme request

- Turn on power and boot up **eBox-2300**
- Select an option from the menu according to your setup and display preference

After eBox-2300 completes the boot-up process and send boot-me request, you will see activities on the **Download Runtime Image** screen showing the image being download to the device.

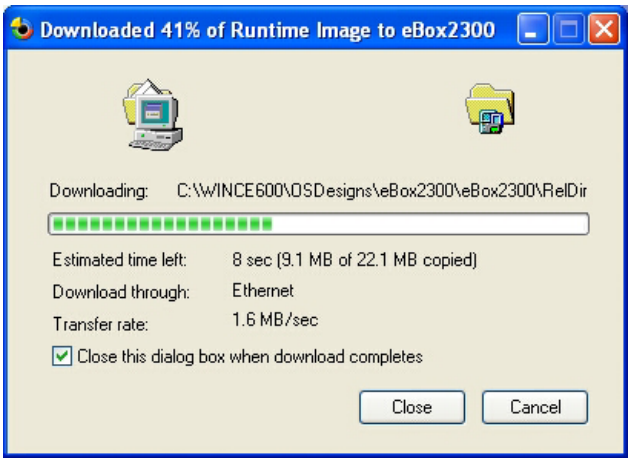


Fig. 23 - Download Runtime Image / downloading

After the image download process is completed, eBox-2300 will load the Windows CE image it just received. Again, be patient… It may take a few moments for the image to come up.

When the Windows CE screen is displayed on eBox-2300, it's an indication the booting process is completed.

Fig. 24 - Windows Embedded CE 6.0 desktop running on eBox-2300

Deploy the CE 6.0 OS Image to the eBox-2300

In the previous step, when the CE 6.0 image is downloaded and launched on the eBox-2300, it's being loaded to the system RAM directly and is not saved to the local storage. To deploy a CE 6.0 OS image onto eBox-2300's local storage, you need to manual copy the OS image, NK.BIN, to eBox-2300's local IDE bootable flash storage.

There are multiple methods to copy the CE 6.0 image to the eBox-2300's local storage.

1. Use a USB bootable flash storage.

   eBox-2300 can be set to boot from USB bootable storage device. Refer to Appendix E for setup information.

   Using a USB bootable flash storage, copy the CE 6.0 OS image file, NK.bin, from \WinCE600\OSDesigns\eBox2300\eBox2300\RelDir\ICOP_Vortex86_60CS_x86_Release directory to the USB bootable flash storage. Boot eBox-2300 with the USB bootable flash storage and copy the NK.bin file to eBox-2300 IDE flash storage's root directory (over written the existing NK.bin file).

2. While running a CE 6.0 image downloaded from the Platform Builder development station, copy CE 6.0 OS image file (NK.bin) from a shared network file folder to the "Hard Disk" folder.

3. Remove the EmbedDisk (IDE bootable flash storage) from eBox-2300 and copy the image file (NK.bin) using hardware setup capable of copying file to IDE storage device. (This method requires disassembling the device and is not recommended.)

Part 6 – Windows Embedded CE 6.0 SDK

In the previous steps, we created configured and built an OS Design that ran on the eBox-2300. Another Windows CE advantage is the ease of application development using Visual Studio 2005. In order to write applications using Visual Studio 2005 and establish a connection to download applications to the eBox-2300 for testing and debug, a CE 6.0 SDK for the OS Design we created in the previous steps is needed.

In this section, we will go thru the step of creating, configuring and building a SDK from the OS Design.

Create and Configure Windows Embedded CE 6.0 SDK

From VS2005 IDE, select **Project | Add New SDK…** to bring up the **SDK Property Pages** screen.

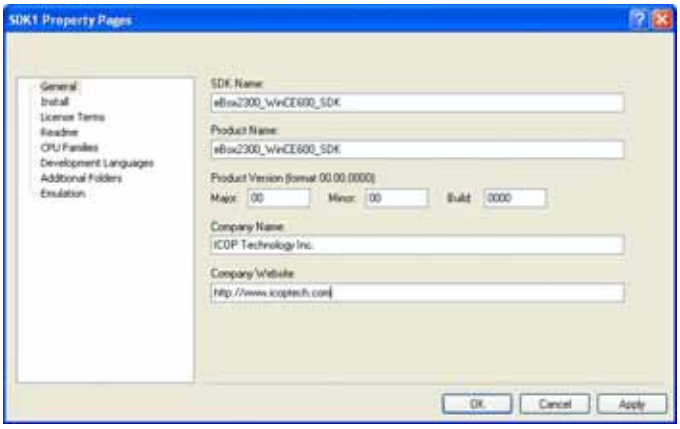


Fig. 25 - SDK Property Page

- Enter eBox2300_WinCE600_SDK as the name for the SDK
- Fill in the company name and company website information
- On the left side of **SDK Property Page**, click on **Install** and enter **MSI folder path** and **MSI file name** on the right side. Use the default path, and enter **eBox2300_WinCE600_SDK.msi** as the file name.

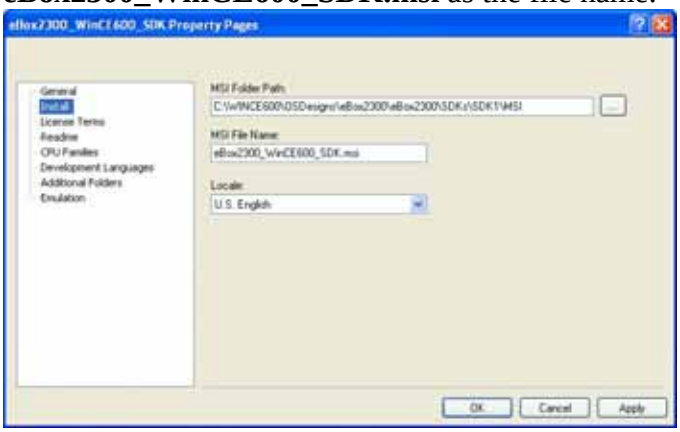


Fig. 26 - SDK Property Page

- On the left side of **SDK Property Page**, click on Development Languages and select both **Native and Managed development support.**

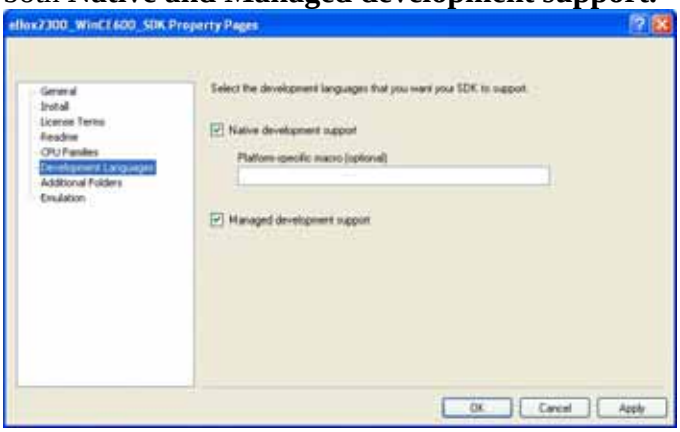


Fig. 27 - SDK Property Page

- Click on the **Apply** and then **OK** button to complete the Add New SDK process.

Note: To make changes to the SDK before building, from VS2005 IDE, select the **Solution** tab, expand the **SDKs** folder, right click on **eBox2300_WinCE600_SDK** and select **Properties** to bring up the **SDK Property Pages**.

Fig. 28 - VS2005 IDE / Edit SDK

Build Windows Embedded CE 6.0 SDK

From VS2005 IDE, select **Build | Build All SDKs…** to build and generate SDK installation file.

A SDK with the file name "**eBox2300_WinCE600_SDK.msi**" is generated in the following directory.

..\WINCE600\OS Designs\eBox2300\eBox2300\SDKs\SDK1\MSI\

Install this SDK to the VS2005 station used to development CE 6.0 application for eBox-2300.

Note: It's a good practice to close VS2005 when installing this SDK.

Part 7 – C# Application with Visual Studio 2005

Visual Studio 2005 can be used to develop native and managed code applications for CE 6.0. This section will go thru the process to show how to connect the eBox-2300 to a development station with Visual Studio 2005 while developing a managed code application using Visual Basic or Visual C#. For the exercise in this section, we will use Visual C#. The steps should be similar for developing with Visual Basic within Visual Studio 2005.

Note: Project files for this exercise are provided in the ..\VC#_Sample directory on the CD.

Step 1: Create a New Visual Studio 2005 C# Project

From Visual Studio 2005 IDE, Select **File | New | Project,** the following new project screen will appear.

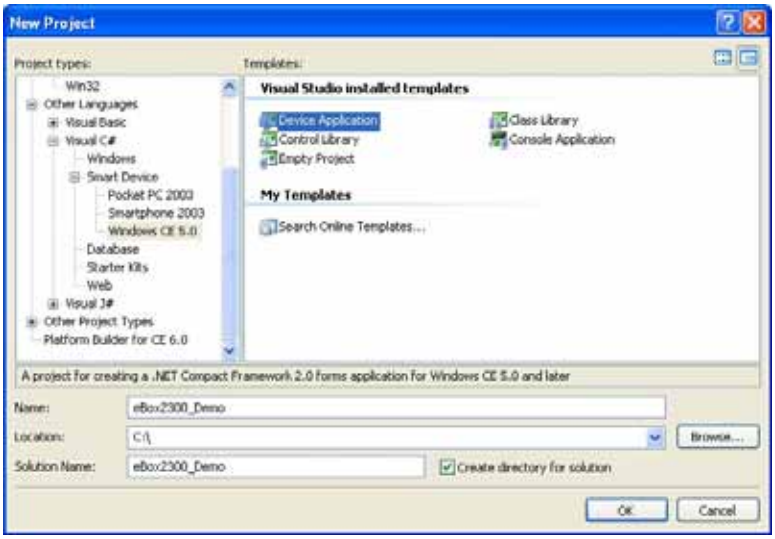


Fig. 29 - VS2005 IDE / New Project

On the left hand side, expand “Visual C#” and “Smart Device” folders to select “Windows CE 5.0. On the right side of the screen, select “Device Application”, enter “eBox2300_Demo” as the project name and click “Ok”.

After the project is created, let’s add some simple code to the application.

- Resize the Form to a smaller size (320x240) to make it easy to see the application when it runs on CE 6.0.
- Change the Form caption to “eBox2300 Visual C# Demo”
- Add a text-box to the form, change the name to textHelloWorld, and clear the content in the text-box
- Add a button to the form, change the name to buttonHelloWorld, and change the text on the button’s caption to “Hello World”

  Add the following code to the “buttonHelloWorld_Click” event.

```
textHelloWorld.Text = "Hello World.";
```

Visual Studio 2005 IDE screen may look like the following screen shot.

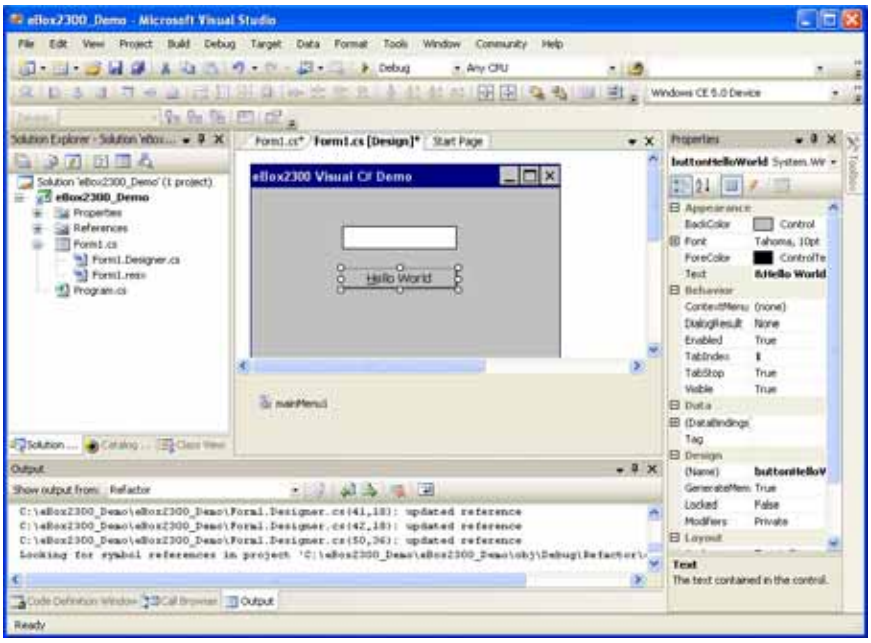


Fig. 30 - VS2005 IDE / New Project

Compile and build the Visual C# application.

Step 2: Preparing eBox-2300 to Connect to VS2005

To perform this portion of the exercise, CE 6.0 image configured and built during the previous sections of this guide must be downloaded and running on eBox-2300, and eBox2300_WinCE600_SDK must be installed.

Corecon components are used to connect eBox-2300 to Visual Studio 2005 development workstation.

The following 5 files need to be copied to \Windows\ folder on eBox-2300.

- Clientshutdown.exe
- ConmanClient2.exe
- CMaccept.exe
- eDbgTL.dll
- TcpConnectionA.dll

These files are stored at the following directory on the Visual Studio 2005 development workstation.

"..\Program Files\Common Files\Microsoft Shared\CoreCon\1.0\Target\wce400\.."

Corecon components supporting different CPU architectures are provided. There are folders, with names corresponding to the CPU, containing Corecon components for each CPU family. eBox-2300 is designed using an x86 CPU architecture. CoreCon components in the "..\x86" sub folder are used.

In the earlier part of this guide, during the Platform-Setting/Environment-Variable step, BSP_VS2005_CORECON environment variable is added to the OS Design. This step triggers Platform Builder to include the above Corecon files, included with ICOP_Vortex86_60CS BSP, to the OS image.

To establish a connection between the eBox-2300 and the Visual Studio 2005 development station, the following steps need to be carried out.

The eBox-2300 IP Address is needed when setting up the device properties within VS2005 to establish connection between eBox-2300 and VS2005 development station.

- From eBox-2300 desktop, with CE 6.0 running, click on **Start | Run** from CE 6.0 desktop with the **cmd** command to open a console command window.

Fig. 31 - CE 6.0 desktop – executing cmd command

- From within the console command window, type **s IpConfig** to view the eBox's assigned IP-address.

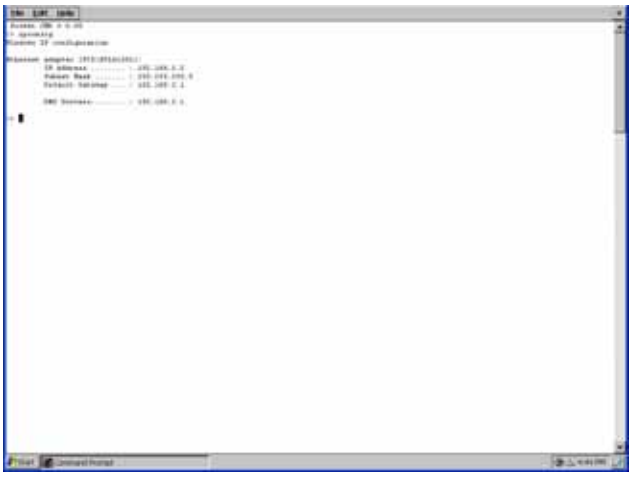


Fig. 32 - CE 6.0 console command window

Now that we have eBox-2300's IP address, let's move to VS2005 IDE to configure device settings. In order for this to work, both the VS2005 development station and eBox-2300 must be connected to the same LAN segment and acquire their IP address from the same DHCP server.

From VS2005 IDE, set the target device to "**eBox2300_WinCE600_SDK x86 Device**"

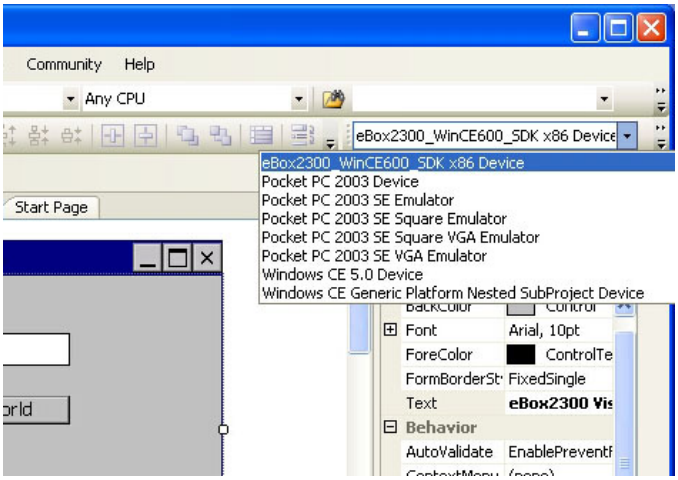


Fig. 33 - VS2005 IDE / select target device

From VS2005 IDE, select **Tools | Options…**

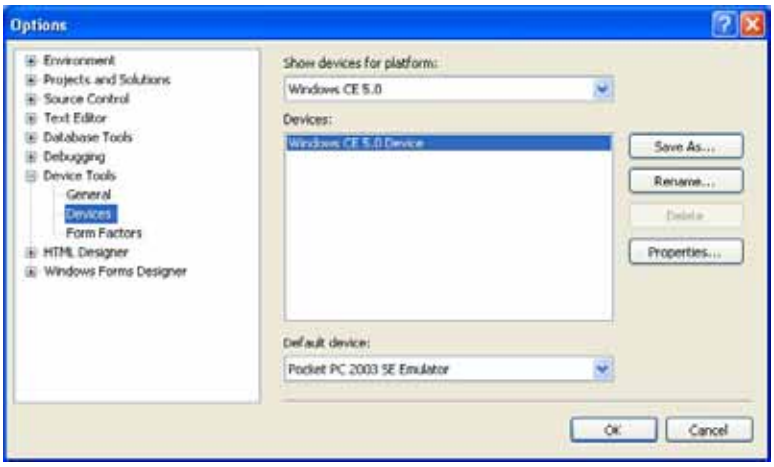


Fig. 34 - VS2005 Tools Options

- On the left, click to expand the "**Device Tools**" folder and select the "**Devices**" sub-folder.
- On the right, select **eBox2300_WinCE600_SDK** from the list of available platform in the **Show devices for platform** combo text box.
- Click on the **Properties** button to bring up **eBox2300_WinCE600 x86 Device Properties** setting screen

Fig. 35 - eBox2300_WinCE600 x86 Device properties

- Click on the **Configure** button to bring up **Configure TCP/IP Transport**
- Select **Use specific IP address** and enter eBox-2300's IP address

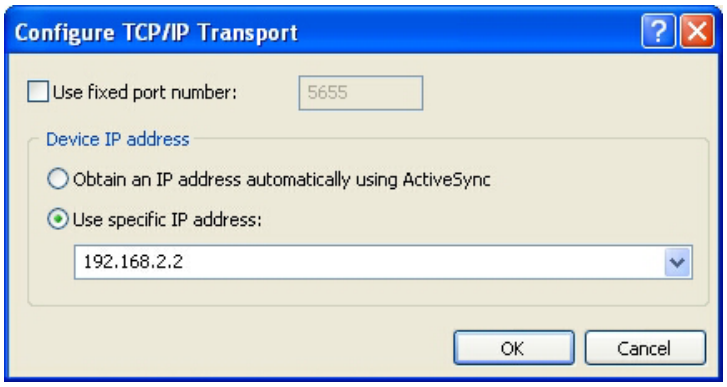


Fig. 36 - Configure TCP/IP Transport / Set device IP Address

- Click **OK** and to commit device IP address setting.

Step 3: Connecting eBox-2300 to VS2005 Station using Corecon

To initiate connection between VS2005 development station and eBox-2300 using Corecon, take the following steps to launch **ConmanClient2.exe** and **cMaccept.exe** Corecon components from eBox-2300.

- From eBox-2300 desktop, with CE 6.0 image created in the earlier steps running, double click on **My Device** and open the **Windows** folder.
- From the Windows folder, double click on **ConmanClient2.exe** follow by double click on **cMaccept.exe** to launch Corecon connection service.
- From Visual Studio 2005 IDE, select **Tools | Connect to device…** and select **eBox2300_WinCE600_SDK** from the list of available devices, and click on the **Connect** button.

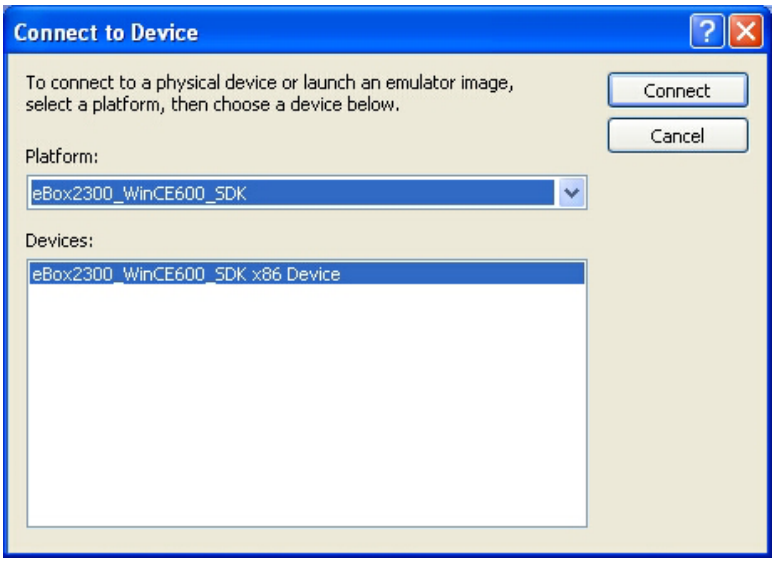


Fig. 37 - Connect to Device (eBox-2300)

When connection is successful, the Connecting dialog box will display Connection succeeded to indicate a successful connection.

Fig. 38 - eBox-2300 connected

Step 4: Download C# Application to eBox-2300

We are now ready to download the C# application to eBox-2300.

From Visual Studio 2005 IDE, select Debug | **Start Debugging** to bring up the **Deploy eBox2300_Demo** screen.

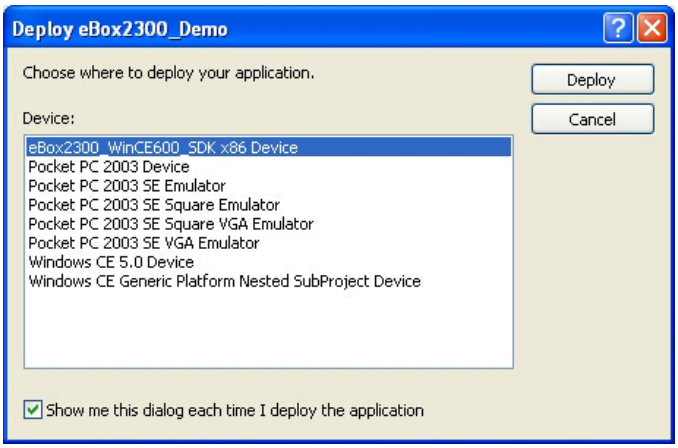

Deploy eBox2300_Demo
Choose where to deploy your application.
Deploy
Cancel
Device:
eBox2300_WinCE600_SDK x86 Device
Pocket PC 2003 Device
Pocket PC 2003 SE Emulator
Pocket PC 2003 SE Square Emulator
Pocket PC 2003 SE Square VGA Emulator
Pocket PC 2003 SE VGA Emulator
Windows CE 5.0 Device
Windows CE Generic Platform Nested SubProject Device
Show me this dialog each time I deploy the application

Fig. 39 - Deploy eBox2300_Demo

- Select **eBox2300_WinCE600_SDK** and click **Deploy**
- The C# managed code application will download and execute on eBox-2300 as shown in the following screen shot.

Fig. 40 - CE 6.0 desktop with C# managed code application running

Debug Information

While it's not within the scope of this guide to cover in depth development and debug issues, we feel it's informative to point out some of the built-in debug resources Platform Builder provides.

Using the same Platform Builder project, "eBox2300", created in the earlier part of this guide. Switch to "Debug" build mode to build a "Debug Image" with the following "Build Options".

From VS2005 IDE, select **Build | Configuration Manager…** to bring up the **Configuration Manager** screen. From the Active solution configuration selection options, select **ICOP_Vortex86_60CS x86 Debug** and click the Close button to set the OS Design to generate a debug image.

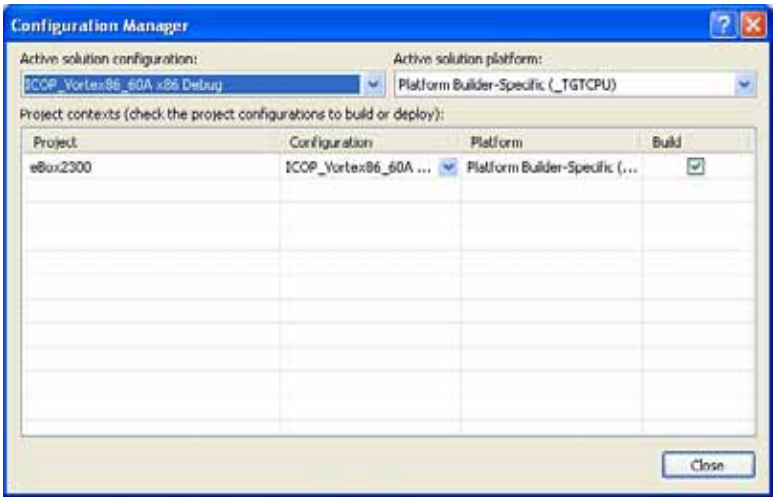


Fig. 41 - Configuration Manager

From VS2005 IDE, select **Project | eBox2300 Properties…** to bring up the OS Design Property screen. Click to expand the **Configuration Properties** folder and select **Build Options**.

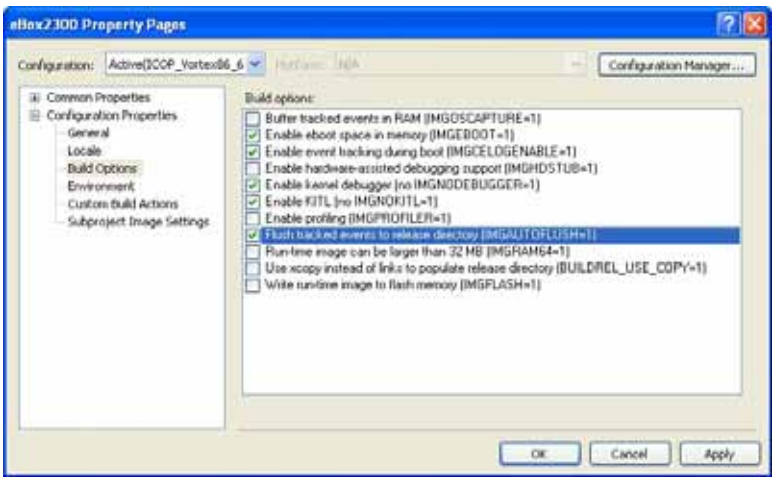


Fig. 42 - Configuration Manager

Enable the associated check box to select the following build options.

- **Enable eboot space in memory** (IMGEBOOT=1)
- **Enable event tracking during boot** (IMGCELOGENABLE=1)
- **Enable kernel debugger** (no IMGNODEBUGGER=1)
- **Enable KITL** (no IMGNOKITL=1)
- **Flush tracked events to release directory** (IMGAUTOFLUSH=1)

Un-check "**Run-time Image Can be Larger than 32MB**" to disable this build option. This build option sets the IMGRAM64 environment variable which in turn sets the system memory to 64MB. The eBox-2300 has 128MB system memory. The BSP is configured to utilize 128MB system memory by default.

Click "OK" to close **Platform Settings** screen.

From the VS2005 IDE, select **Build | Build Solution** to build the debug image from the OS Design project.

After the debug image build process is completed, follow the procedure in "Download Image to eBox-2300" (page 24) to download the debug image to eBox-2300.

After the debug image is downloaded to eBox-2300, the Platform Builder IDE should look similar to the following screen.

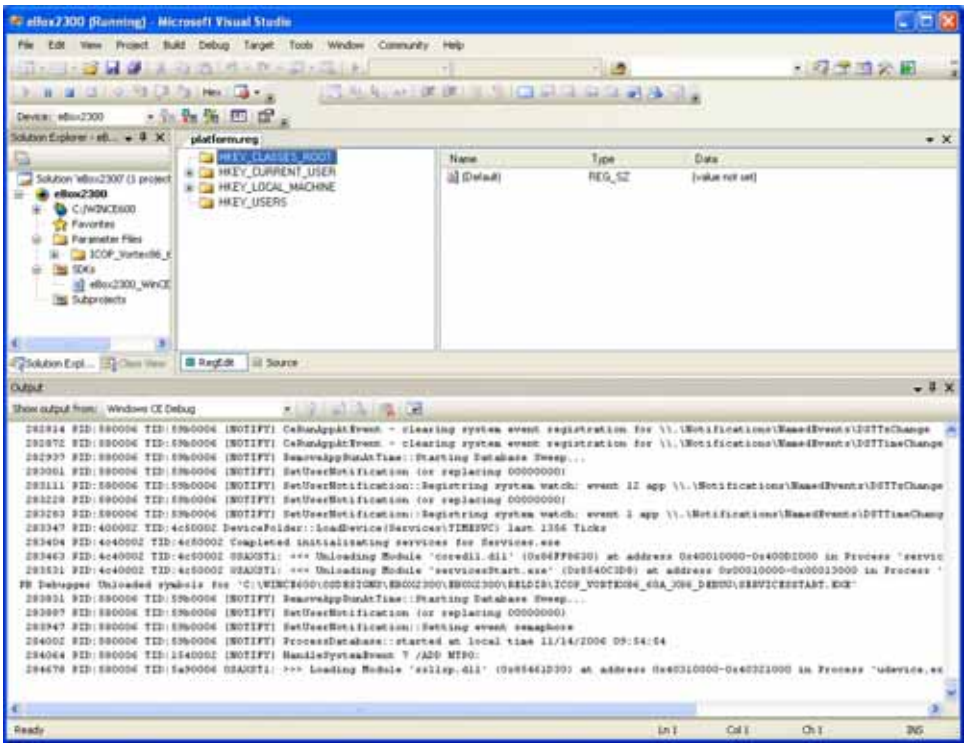


Fig. 43 - VS2005 IDE

Within Platform Builder's **Debug Output** window, the display shows much more detailed information about the image's boot up and device driver loading process. The additional information is useful, and may be critical, to help debug and solve problems and prevent potential problems. Debug output messages can be copied to a text file to be analyze in detail. Refer to Platform Builder online document for more information about various debug and trouble shooting resources available.

NOTE: The debug image takes more time to complete the boot process. Be patient and let the image complete the boot process.

Summary

You have now completed all the steps in this guide. Here's what we have covered:

- Created an OS Design project
- Customized the OS Design by adding additional components
- Built a Windows CE image from the OS Design
- Downloaded a Windows CE image to eBox-2300
- Create a C# managed code application using Visual Studio 2005
- Establish connection between eBox-2300 running CE 6.0 and VS2005 development station using Corecon
- Deploy C# managed code application from VS2005 and launch on eBox-2300 running CE 6.0
- Configure the OS Design to build a debug image.

Congratulations! - You've completed all the steps.

There are many additional resources to help you gain additional Windows CE knowledge.

Microsoft Web sites.

http://msdn.microsoft.com/embedded/getstart/default.aspx

http://msdn.microsoft.com/embedded/usewinemb/ce/default.aspx

http://msdn.microsoft.com/embedded/getstart/basics/default.aspx#ceadv1

http://msdn.microsoft.com/embedded/community/community/newsgrp/

To learn more about Vortex86 hardware, visit the following Web sites.

http://www.vortex86.com

http://www.icoptech.com

Or contact ICOP email: info@icoptech.com

Phone: (626) 444-6666

Update to this jumpstart guide and other Windows CE information resources are available at the following web site:

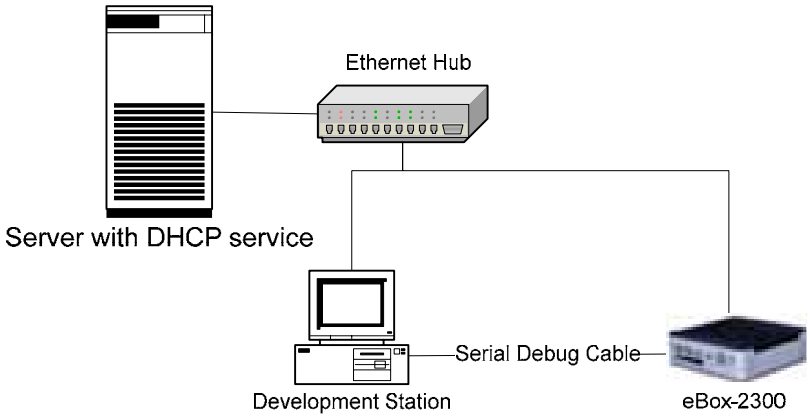
http://www.embeddedpc.net

Additional Windows CE information references are available in the Appendixes.

Appendix A – Development Environment Setup - with DHCP service

It's recommended that you use Windows XP Professional with your development station. Both the development station and eBox-2300 should be connected to the same Local-Area-Network with DHCP service.

A NULL modem serial cable linking one of the development station's COM ports with the eBox-2300's COM1 port provides additional debug information.



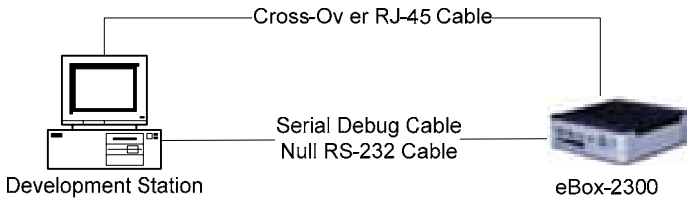
This is a typical setup. Both the development station and eBox-2300 are connected to a Local LAN with DHCP service. The null serial debug cable is connected between development station's COM1 and eBox-2300's COM1.

If the eBox does not boot with this configuration, you may need to enable DHCP service for each new device on your network. Some secure networks require that the MAC address be added to the list of devices authorized for DHCP in the DHCP server.

Appendix B – Development Environment Setup – Without DHCP

It's recommended that you use Windows XP Professional with your development station. In this setup, eBox-2300 is connected directly to the development station's Ethernet port using a Crossover RJ45 Ethernet cable.

A NULL serial cable linking between one of the development station's COM port with eBox-2300's COM1 provides additional debug information.



When eBox-2300 is connected directly to the development station as above, the IP address for the development station must be configured correctly for it to work.

When working with this setup method, 192.168.2.232 is the preset static IP address for eBox-2300.
The development workstation's IP address needs to be set correctly for this to work.

Following is the IP address setting guideline for the development station.

IP address: 192 . 168 . 2 . xxx (must be different from eBox-2300's IP address)

Subnet mask: 255 . 255 . 255 . 0

If the IP address is not setup correctly, eBox-2300 will not able to communicate with the development station.

Appendix C – Windows CE Technical Information Reference

Windows CE Reference

Mike Hall's Blog
http://blogs.msdn.com/mikehall
Anything has to do with Windows Embedded technologies, Mike Hall probably knows about it. There are tons of useful information related to Windows CE on Mike's blog.

Windows Embedded Tutorials
http://msdn.microsoft.com/embedded/getstart/basics/default.aspx
This site provides how-to tutorials on basic and advanced topics about using Windows CE in development of embedded devices.

Windows Embedded News Group
http://msdn.microsoft.com/embedded/community/community/newsgrp/default.aspx

Windows Embedded Worldwide - China
http://www.microsoft.com/china/windows/embedded/default.mspx

Windows Embedded Worldwide - Japan
http://www.microsoft.com/japan/windows/embedded/default.mspx

Windows CE shared source projects

USB Webcam driver for Windows CE shared source project
http://www.gotdotnet.com/workspaces/workspace.aspx?id=0eb87e35-13e4-4fa3-9fde-71e9136f47de
USB Webcam device driver for Windows CE - Logitech QuickCam Pro-5000 is the Webcam used for this project.

Phidgets USB I/O driver shared source projects
http://www.codeplex.com/Project/License.aspx?ProjectName=PhidgetsWinCEDriver
USB I/O device with GPIO, A/D, servo control, sensors, RFID reader & etc…

Other Useful Links

http://www.windowsembedded.com.tw
This site provides Windows Embedded information resources in English and Traditional Chinese.

http://www.windowsembedded.com.cn
This site provides Windows Embedded information resources in Simplified Chinese.

http://www.windowsembedded.jp
This site provides Windows Embedded information resources in Japanese.

http://www.learningce.com
This site has useful reference for Windows CE.

http://www.embeddedpc.net
This site has useful reference for Windows CE.

Hardware Reference Information

Vortex86 System-On-Chip
http://www.vortex86.com
eBox-2300 is designed and built using Vortex86(SiS-55x) System-On-Chip. Datasheet and technical information for Vortex86 System-On-Chip is available on this web site.

Appendix D – eBox-2300 Technical Information

eBox-2300 is design and built using Vortex86 System-on-Chip. It has similar architecture as typical x86 CPU based CEPC.

eBox-2300 has an IDE interface internally to support EmbedDisk or any IDE bootable flash storage using the standard 44-Pin IDE interface (the same interface used on the common 2.5" IDE notebook hard drive). eBox-2300 uses AMI BIOS and can boot from DOS, Windows 98, Windows XP, Windows XP Embedded and Windows CE using boot loader.

eBox-2300 is designed and manufactured by ICOP Technology Inc., a Gold Level Partner in Microsoft's Windows Embedded partner program, and recognized by Microsoft as 2005 Partner-of-The-Year in the Independent Hardware Vendor (IHV) category.

URL: http://www.icoptech.com Email: wep@icoptech.com

eBox-2300 has all the typical I/O peripherals as the desktop PC.

- VGA
- PS/2 Keyboard and Mouse
- Ethernet
- Serial
- USB
- Audio output
- Microphone input
- CompactFlash

eBox-2300 System Specification

CPU
Vortex86 SoC (System on Chip)

Main Memory
128MB SDRAM

BIOS
AMI BIOS

VGA
AGP Rev.2.0 Compliant
Resolution up to 1,280x1,024 High Colors

Audio
AC97 CODEC, Fully Compliant with AC97v2.1

LAN
Realtek 8100B, 10/100Mbps Ethernet

On-Board IDE
Enhanced IDE interface, 44-pin box header x 1

Keyboard and Mouse
PS/2 Keyboard and Mouse

Peripheral
1. USB V1.1 ports x 3
2. Serial port x2(This function only available for eBox-2300-JSK)
3. Audio(Mic-in, Line-in)
4. Type I/II CF Slot (Support Micro Driver)

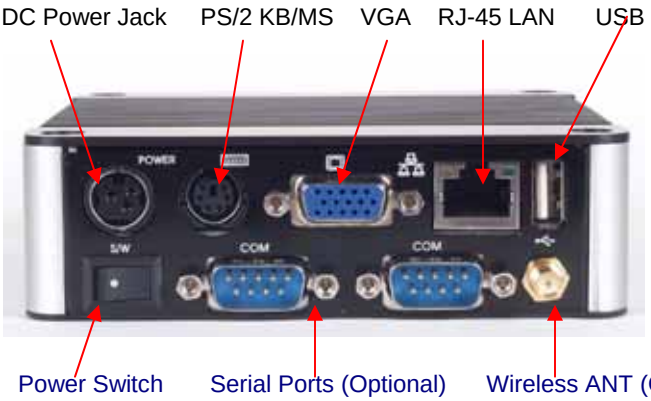
Dimension & Weight
115 x 115 x 35 mm / 505g

OS Support
DOS
Windows CE.NET 4.2
Windows CE 5.0
Windows Embedded CE 6.0
Windows XP Embedded

Power Requirement
+5VDC

Front Connectors Outline for eBox-2300

Rear Connectors Outline for eBox-2300

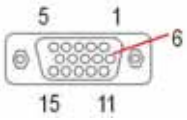


Connectors Summary for eBox-2300 main system board

Connector	Description	Type of Connections	Number of Pins
J1	VGA Connector	D-Sub Connector	8-pin
J2	Power Button	Power Button	
J3	USB (Back)	USB Connector	8-pin
J4	PS/2 keyboard or Mouse	Mini DIN Connector	6-pin
J5	RST (Reset)	Hear 2x1 2.0mm	2-pin
J6, J7	USB (Front)	USB Connector	8-pin
J8	LAN	RJ-45	8-pin
J9	Line Out	Audio Jack	
J10	Mic In	Audio Jack	
J11	IDE connector	Box Header 22x2 2.0mm	44-pin
J12	CF Device Jumper	Close : Master	2-pin
J14	DC 5V Input	Mini-Din Connector	3-pin
J16,1J7:	COM Port	Box Header 5x2 2.0mm	10-pin
J18:	Mini PCI	Mini PCI socket	124-pin

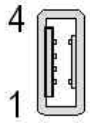
Pin Assignment

J1: VGA – 15-pin D-Sub Connector



Pin #	Signal Name	Pin #	Signal Name	Pin #	Signal Name
1	MR	6	GND	11	NC
2	MG	7	GND	12	VCC
3	MB	8	GND	13	HYSYNC
4	NC	9	NC	14	VSYNC
5	GND	10	GND	15	VCC

J3: USB (90°)– 4-pin USB Type 1 Connector (Vertical Type)

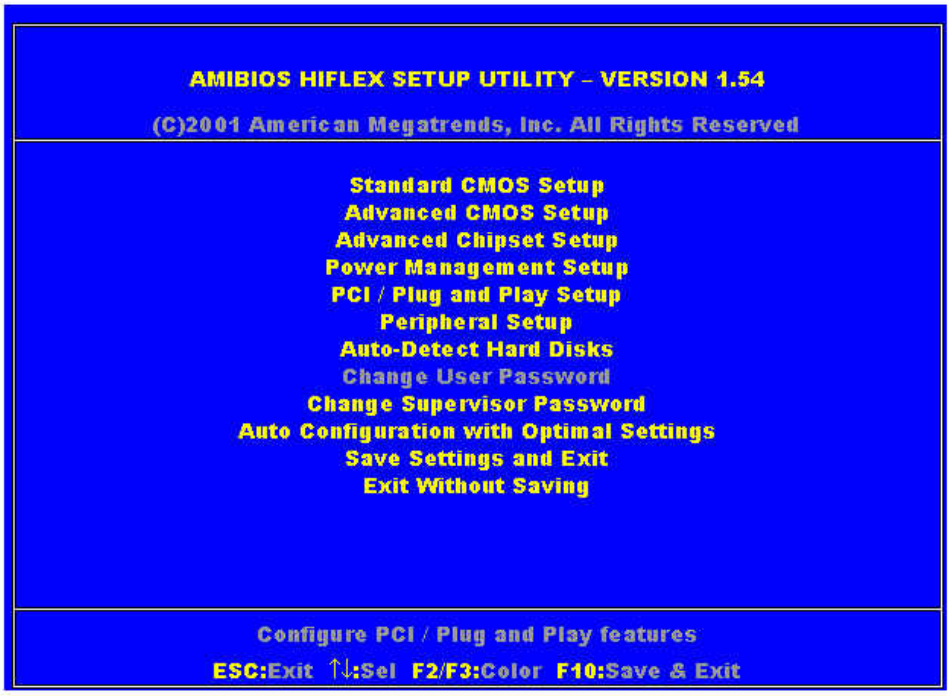


Pin #	Signal Name
1	VCC
2	USB0-
3	USB0+
4	GND
5	GGND
6	GGND

System BIOS

Reconfiguring eBox-2300

1. Take note that AMI BIOS is used in the eBox-2300 VESA PC. To reconfigure the VESA PC, depress or hit the <Del> key to enter your BIOS setup main menu.
2. Select from the menu, the desired setup for change.
3. Press <Esc> to go back to main menu.
4. Move your cursor to “Save Settings and Exit”, press “Y” to save the changes that you just made. eBox-2300 will restart accordingly to your new setup.


AMIBIOS HIFLEX SETUP UTILITY – VERSION 1.54
(C)2001 American Megatrends, Inc. All Rights Reserved
Standard CMOS Setup
Advanced CMOS Setup
Advanced Chipset Setup
Power Management Setup
PCI / Plug and Play Setup
Peripheral Setup
Auto-Detect Hard Disks
Change User Password
Change Supervisor Password
Auto Configuration with Optimal Settings
Save Settings and Exit
Exit Without Saving
Configure PCI / Plug and Play features
ESC:Exit ↑↓:Sel F2/F3:Color F10:Save & Exit

Memory Mapping	
Address	**Description**
0000:0000-9000:FFFF	System RAM
A000:0000-A000:FFFF	EGA/VGA Video Memory
B000:0000-B000:7FFF	MDA RAM, Hercules graphics display RAM
B000:8000-B000:FFFF	CGA display RAM
C000:0000-C000:BFFF	EGA/VGA BIOS ROM
CC00:0000-CC00:3FFF	Boot ROM enable.
D000:0000-E000:7FFF	Expansion ROM space.
E000:8000-E000:FFFF	USB Legacy SCSI ROM space.
F000:0000-F000:FFFF	Motherboard BIOS

I/O Mapping	
I/O Address	**Device**
000h - 00Fh	8237 DMA Controller #1
020h - 021h	8259 Master Interrupt Controller
040h - 043h	8253 Programmable Timer
060h - 06Fh	8042 Keyboard Controller
070h - 07Fh	RTC, NMI Mask Register
080h - 09Fh	DMA Page Registers
0A0h - 0B1h	8259 Slave Interrupt Controller
0C0h - 0DFh	8237 DMA Controller #2
0F0h - 0F1h	Math Coprocessor
0F8h - 0FFh	Math Coprocessor
1F0h - 1F8h	Hard Disk Controller #1
278h - 27Fh	Parallel Printer **
2E8h - 2EFh	Serial Port 4**
2F8h - 2FFh	Serial Port 2
378h - 37Fh	Parallel Printer**
3B0h - 3BBh	MDA Adapter
3BCh - 3BFh	Parallel Printer**
3C0h - 3CFh	VGA/EGA Adapter
3D0h - 3DFh	CGA Adapter
3E8h - 3EFh	Serial Port 3**
3F0h - 3F7h	Floppy Controller #1**
3F8h - 3FFh	Serial Port 1

** eBox-2300 does not expose these devices

IRQ Mapping	
IRQ#	**Device**
IRQ0	System Timer
IRQ1	Keyboard Controller
IRQ2	Cascade for IRQ8 - 15
IRQ3	Serial Port 2
IRQ4	Serial Port 1
IRQ5	Unassigned
IRQ6	Unassigned
IRQ7	Unassigned
IRQ8	Real Time Clock
IRQ9	Unassigned
IRQ10	USB
IRQ11	Ethernet 10/100M LAN
IRQ12	Mouse
IRQ13	Math Coprocessor
IRQ14	Hard Disk Controller
IRQ15	Unassigned

Appendix E – eBox-2300 Boot Options

By changing the BIOS settings, eBox-2300 can be set to boot from the following resources.

- Internal IDE storage
- CompactFlash
- USB Floppy
- USB storage
- USB CD/DVD-ROM drive
- Remote Network Boot using PXE

By default, eBox-2300 is set to boot from the internal IDE storage.

To change the boot device, enter system BIOS setting mode to change boot settings. To enter system BIOS setting mode, press the **DEL** key multiple times immediate after turning on the power on.

AMIBIOS HIFLEX SETUP UTILITY - VERSION 1.54
Standard CMOS Setup
Advanced CMOS Setup
Advanced Chipset Setup
Power Management Setup
PCI / Plug and Play Setup
Peripheral Setup
Auto-Detect Hard Disks
Change Supervisor Password
Auto Configuration with Optimal Settings
Auto Configuration with Fail Safe Settings
Save Settings and Exit
Exit Without Saving
Standard CMOS setup for changing time, date, hard disk type, etc.
ESC:Exit ↑↓:Sel F2/F3:Color F10:Save & Exit

Select Advanced CMOS Setup to bring up BIOS settings for Boot Device options.

USB storage and CF card must be plugged into eBox-2300 prior to turning on the power in order for the BIOS to detect the devices' present. Otherwise, USB storage and CF card will not be available as one of the boot device options.

Note: The **USB RMD-FDD** boot option support USB bootable flash storage.

Most USB flash storage can be program to become bootable to DOS (refer to the USB flash storage vendor support site for information).

USB storage is one of the most convenience methods to transfer files from development station to eBox-2300's internal IDE flash storage. By setting the **1st Boot Device** to **USB RMD-FDD** and **2nd Boot Device** to **IDE-0**, eBox-2300 will attempt to boot from USB storage when it's plugged into the system. Otherwise, it will boot from the internal IDE flash storage.